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Edmund Hodgson

Britton Hill.

C. B. Somerset

18428 d. 78

THE

ASTRARIUM IMPROVED;

OR,

VIEWS OF THE PRINCIPAL

FIXED STARS AND CONSTELLATIONS,

REPRESENTED ON

TWELVE PLATES,

(ONE FOR EACH MONTH IN THE YEAR;)

FROM WHICH

THEIR NAMES AND RELATIVE SITUATIONS MAY BE KNOWN

BY SIMPLE INSPECTION.

LONDON:
PRINTED FOR JOHN CARY, NO. 181, STRAND.
1813.

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BODLEIAN
15 MAY 1935
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Printed by S. Gosnell, Little Queen Street, London.

TO

MR. WILLIAM WALKER,

LECTURER ON THE EIDOURANION.

DEAR SIR,

The encouragement which you kindly gave me to submit the following Plates to the eye of the Public, has tempted me to take the liberty of inscribing my publication to you.

I have only attempted to smooth the approaches to that science, whose extensive sphere you have embellished with useful and magnificent decoration. But the humblest votary of a favourite science is often fortunate enough to find favour from its most eminent and successful professors.

That you may long and happily cultivate that inexhaustible field of knowledge, in which you have already gained celebrity, is the sincere wish of,

Dear Sir,

Your obliged Friend, and

Humble Servant,

J. MARSH.

Chichester, March 8, 1806.

PREFACE.

WHILST a knowledge of the science of Geography is deemed a necessary accomplishment, it seems extraordinary that its sister science ASTRONOMY (the geography, as it were, of the heavens) should be so little cultivated; it being no uncommon thing for persons of liberal education, on being applied to in respect to any planet or fixed star, to confess their entire ignorance of Astronomy. Or should indeed a smattering be attained, it is generally confined to a knowledge of two or three of the more remarkable constellations; as the Great Bear, Orion, &c. which can scarcely escape general observation.

One reason why the study of Geography and Astronomy is not in general *equally* cultivated, may be, that the former can, in great measure, be attained by the use of maps, whereas the latter requires the assistance of a globe, which can only be resorted to at home, and not when on a journey or pleasurable excursion, during which the stars are more likely to obtrude themselves on our notice, than whilst pursuing our usual avocations.

A knowledge of Astronomy being also chiefly communicated by mathematical diagrams and problems, a youth is frequently deterred from entering at all into it, from a fear that either some knowledge of the mathematics must first be acquired, or that, through ignorance of them, the study of Astronomy must be rendered abstruse and perplexing.

To obviate the difficulties of both sciences, and form, as it were, "a royal road" to them, different instruments have been invented: for the student in Geography, dissected maps and games; and for the student in Astronomy, planetariums and planispherical orreries; and also an apparatus upon moveable principles, called an Astrarium, particularly contrived to show the position of the fixed stars at any time of the night.—Since, however, in order to set this astrarium, the sun's place in the ecliptic must first be found, and the stars shown, as they would appear at *noon,* from which an arithmetical calculation must be made, before the moveable card can be set to exhibit the appearance required at *night*; and this calculation is liable to mistakes; I have, with a view to prevent such inconveniences, and at the same time still more to facilitate the knowledge of this interesting science, contrived the following diagrams, which by *simple inspection,* and without any kind of calculation, will show the relative positions of the *principal* fixed stars, and constellations, for every month in the year.

EXPLANATION OF THE PLATES.

As the Stars represented within the upper or smaller circle in each Plate never set, to inhabitants of this part of the world, this is technically termed the *Circle of perpetual Apparition*; and the large circle forming the boundary of the whole, the *Horizon.* The perpendicular line denotes the *Meridian*, or imaginary line which the Sun, Moon, and Planets pass, when they are at their greatest elevation, in respect to the observer, whose situation is always supposed to be that central point, where the meridian is crossed by another straight line from west to east: and this point is called the *Zenith.*

The curve line from west to east, crossing the meridian at the same distance below the north pole, as the zenith is from the horizon, is denominated the *Equator*, from its dividing the globe into two *equal* hemispheres, of which the north and south poles are the centres.

The two dotted circular lines to the north and south of the equator (one in each hemisphere) represent the *Tropics* of *Cancer* and *Capricorn*; and the double curve line between them the *Ecliptic* (or Sun's path in the zodiac), which crossing the equator, is bounded by the tropic of Cancer on the north, and by that of Capricorn on the south.—Near the ecliptic, the Moon and Planets also proceed in their courses.

The twelve plates or diagrams being all adjusted to the *middle* of the several months, I shall now explain how they may be resorted to with equal utility, at the beginning, end, or any intermediate night of the month.

As the Earth, besides its *annual* revolution round the Sun, makes a *daily* rotation upon its axis, the same alteration in the aspect of the heavens which may be observed in the course of a year, also takes place in the course of every twenty-four hours.—For instance, in the first plate (that for January); Capella is near the meridian, at the lower part of the circle of perpetual apparition. In that for April, it appears to have advanced a quarter of that circle, in its progress round the polar star; and in the plate for July, to have moved half round, being just opposite to its situation in January.—In like manner, by attending to the same star, or any other within or near the circle of perpetual apparition, on any evening at six, and again at midnight, it will, during those six hours, appear to have advanced a quarter of its circuit, and at six the next morning will be exactly opposite the station in which it was twelve hours before.

It therefore follows, that twelve hours of the diurnal apparent * revolution of the stars, exactly coincides with six months of their annual revolution; and of course, six hours of the former, with three months of the latter; two hours with one month, and one hour with a fortnight. So that if I wish to refer to either of the plates at the *beginning* of any month; that being a *fortnight* before the time for which it is adjusted, I have only to do it *an hour later* than either of those specified; as by that time the stars will have so far advanced in their circuit, as exactly to coincide with their appearance in the diagram for that month. And of course, should I have occasion for such reference at the *end* of the month, I must make my celestial observation *one hour earlier* than directed, which exactly counteracting the difference of space the stars would then have traversed, the appearance will be the same as in the middle of the month at the hour specified.—For a smaller deviation from the time of adjusting the diagrams than a fortnight, or should I wish to refer to them at any other part of the month, I may take my comparison at the time directed for the middle of it; only considering, that in the first part, the stars will not have moved *quite so far* as appears by the plate; and towards the latter part of the month, will have passed a *very little beyond it*, and making an allowance accordingly; the relative situation of the stars to each other, being in both cases exactly the same.

And in like manner, as the plates are adapted to the latitude and longitude of the metropolis; at any considerable distance from it, a *small* allowance must be made, as in Scotland, or the north of England, where the stars will appear a little more southerly; and in Ireland, or the west of England, where they will seem to be rather more easterly than is here expressed.

In a short time, however, it is to be presumed, that the principal constellations and fixed stars may, by the help of this work, be as accurately known at sight, as the different parts of the world, from the previous inspection of a map; and to this end the following hints may yet be of use.

---

* I say apparent, because it is in fact the Earth that moves, and not the Stars.

The great Bear *(Ursa Major,* in the plates) being first known, as a constellation within the circle of perpetual apparition, consisting of seven principal stars, of the second and third magnitude (of which four seem to represent the body and three the tail)—by observing the two foremost of them (those farthest from the tail) the *polar star* may be ascertained, being always due north of the observer, and pointed to by those two stars of the great Bear, which are therefore called the *Pointers.*

The north pole star being thus readily known, it will be easy enough to ascertain the little Bear *(Ursa Minor),* as being two stars of the second and third magnitude, not far from it, with four other small stars, forming together a similar constellation to that of Ursa major, but smaller and reversed, extending to the polar star, which forms the tip of its tail.—Next *Arcturus* may be observed, being a star of the first magnitude in Boötes, nearly pointed to by the two stars at the extremity of the tail of the great Bear.

The only remaining constellation of any note, within the circle of perpetual apparition, is *Cassiopeia,* five stars of the second and third magnitude, in an opposite direction to the great Bear; the polar star being about midway between them.

Capella and *Lyra* are two stars of the first magnitude, the former a little within, and the other upon the circle of perpetual apparition, but nearly opposite to each other, so that when the one is nearly vertical, the other may be seen towards the north.

Near the equator, *Atair,* a star of the first magnitude, may be easily known by a small one just above it, pointing towards Lyra; with which and *Cygnus* (a star of the second magnitude within the circle of perpetual apparition) it forms a large triangle.

Late in the evening towards the end of the year, and early at the beginning of it, appears, upon the equator, the remarkable constellation of *Orion,* distinguished by its *belt* of three stars, about the midway between two of the first magnitude. This is preceded in its course first by *the Pleiades,* a cluster of small stars in Taurus, and then by *Aldebaran,* a large star in the same constellation, and followed by *Sirius*, the *Dog-star*, the largest and brightest of any in the heavens, on which account it is supposed to be the nearest to us. Near the upper part of Orion is the constellation of *Canis minor*, and at a short distance above it (or towards the pole) *Gemini*; each consisting of two principal stars, of the first and second magnitude.

The last star I shall here mention is *Cor Scorpionis*, of the first magnitude; not indeed so large as Sirius, but remarkable for its very brilliant appearance, when at its greatest elevation. This being the most southern of all the remarkable stars, to observers in these parts (except one in the Whale, seldom seen), never rises high above the horizon, and therefore only appears for a few hours at a time.—And here it may be remarked, that, as the stars within the circle of perpetual apparition never set, so the farther they are situated without it, the shorter is the time during which they are visible. And this is the reason why we see so little of Orion, Sirius, and Cor Scorpionis, in comparison of Arcturus, Capella, Ursa Major, and others, which are visible all the year round, or the greater part of it.

OF THE PLANETS.

As the Planets revolve round the Sun like the Earth, and of course are continually shifting their situation; it is impossible to notice them in the following diagrams. They may however assist us to discover them, as well as the fixed stars, with the help of an Ephemeris. For instance, suppose I see a star of considerable magnitude, which, from its not being laid down in the plates, I conclude to be a planet: by noticing its situation in respect either to the point of the compass or to any fixed star near it, I on a reference to the diagram for that month easily find what sign of the zodiac it is in, and by consulting the Ephemeris, the name of the planet then in that sign.—Or suppose I want to know what planets are visible, at any particular hour: by first referring to the plate for the month and hour, and observing what part of the ecliptic is then above the horizon, and afterwards looking at the Ephemeris, I discover what planets are in any of those signs, and of course know whereabout to look for them.

As, however, the planets differ from the fixed stars, by not twinkling, they are readily distinguished from them, and the more remarkable ones of Venus and Jupiter easily recollected, without any reference to the diagrams.

For instance, as the orbit of *Venus* is much nearer to the earth's orbit, than that of any of the other planets, it appears to us as the largest. And as it is nearer the sun than the earth (being included within the earth's orbit), it never appears in an opposite direction from the sun, and is always to be seen in an evening either to the west or the south-west, or in a morning towards the east or south-east.

Jupiter, although by much the largest of all the planets, yet, from its very great distance from the earth, appears smaller than Venus, to which it is however the next in apparent magnitude and brightness. But as it is farther from the sun than we are (its orbit including that of the earth), it is not confined to the neighbourhood of the sun, like Venus and Mercury, but sometimes appears in the opposite hemisphere; and, by thus shifting its situation, seems sometimes almost as large as Venus, and at others nearly as small as *Mars*, which planet is known by its extremely red appearance.

Saturn's most striking peculiarity is its *Ring*, which can only be seen through a telescope; and from the immense distance of this planet from us, it frequently appears as a very small star, although it is, in fact, the next in magnitude to Jupiter.

It only remains to mention *Mercury*, which being the nearest of any of the planets to the sun, is generally lost in its rays, and is seldom distinguished with the naked eye by a common observer;—and the *Georgium Sidus*, which (from its immense distance from us) can likewise scarcely be perceived by those who are not well skilled in Astronomy.

In order to enable the young student to form a general idea of the solar system, and of the distances of the planets from the sun and each other; at the bottom of the first plate is added a line, which may be considered as a ray from the sun crossing the orbits of Mercury, Venus, the Earth, Mars, and Jupiter.—Taking therefore this as a scale, and fixing one point of a pair of compasses in the middle of a sheet of paper, and describing five concentric circles at the distances marked by the intersections of the respective orbits, those of the several planets may be pretty accurately exhibited, and their distances from the sun and each other made apparent, except the orbit of Saturn, for which a circle may be described of nearly double the radius of that of Jupiter.—As for the orbit of the Georgian planet, that must be considered as far beyond all the others, and the fixed stars at a distance perfectly incalculable.

With respect to the proportionable magnitudes of the planets, the times of their diurnal and annual revolutions, and other phænomena of them and the fixed stars, as they do not fall within the plan of this small work (the intention of which is only to give, as it were, the *Alphabet* of Astronomy), I must refer the reader who wishes for further information thereon, to the treatises of Ferguson, Bonnycastle, or any other of the later popular works upon this subject, and also to the globes themselves, to the use of which (so far from being intended to explode them) the following diagrams are only meant to prepare the way, or occasionally to be used as a substitute for them, when not at hand.

Having used the Latin terms for the constellations, &c. in the diagrams, as being more concise and common than the English ones, I here add a translation of them, and of the signs of the zodiac.

1. Aries,	The Ram.
2. Taurus,	The Bull.
3. Gemini,	The Twins.
4. Cancer,	The Crab.
5. Leo,	The Lion.
6. Virgo,	The Virgin.
7. Libra,	The Balance.
8. Scorpio,	The Scorpion.
9. Sagittarius,	The Archer.
10. Capricornus,	Capricorn.
11. Aquarius,	The Water-bearer.
12. Pisces,	The Fishes.

Aquila,	The Eagle.
Auriga,	The Charioteer.
Capella,	The Goat.
Caput Medusæ,	Medusa's head.
Canis major,	The great Dog.
Canis minor,	The little Dog.
Cetus,	The Whale.
Cor Caroli,	Charles's heart.
Cor Hydræ,	The Hydra's heart.
Cor Leonis,	The Lion's heart.
Cygnus,	The Swan.
Delphinus,	The Dolphin.
Draco,	The Dragon.
Hydra,	The Hydra.
Lyra,	The Lyre.
Pegasus,	The flying Horse.
Serpens,	The Serpent.
Serpentarius,	The Serpent-bearer.
Spica Virginis,	The Virgin's ear of corn.
Ursa major,	The great Bear.
Ursa minor,	The little Bear.

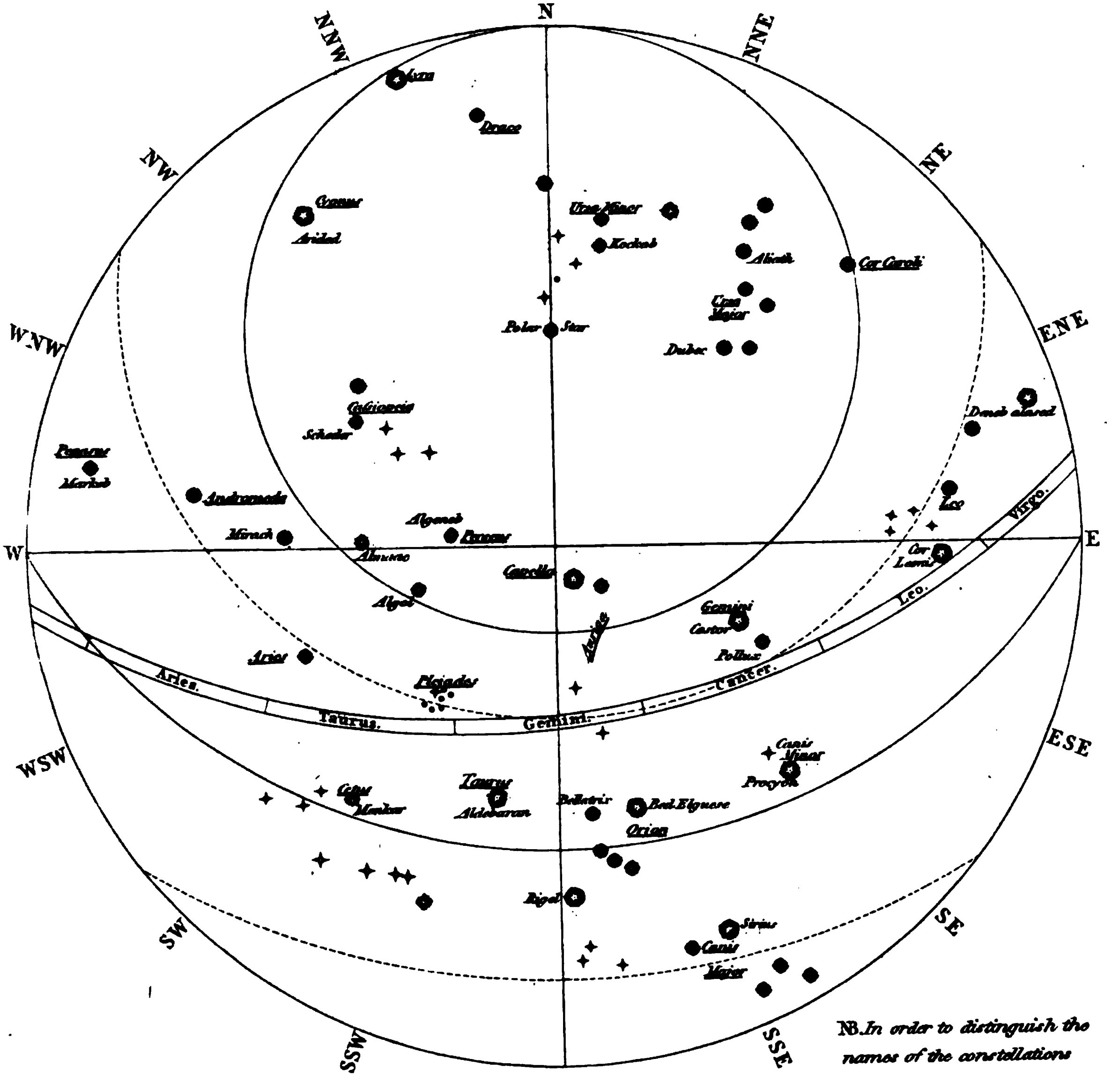
To prevent crowding the plates, I have omitted the *figures* of the constellations usually delineated, and have inserted only the stars of the first and second magnitude, with some few of the smaller ones; as there can certainly be no greater necessity for bringing *all* the stars of a hemisphere into a diagram of six inches diameter, than for laying down every province and city, in a map of the world of the same diameter.

THE END.

S. Gosnell, Printer, Little Queen Street, London.

Middle of January at 9 in the Evening.

February at 7. —— December at 11.



NB. *In order to distinguish the names of the constellations from those of the Stars, the former have lines drawn under them, thus, Canis Major.*

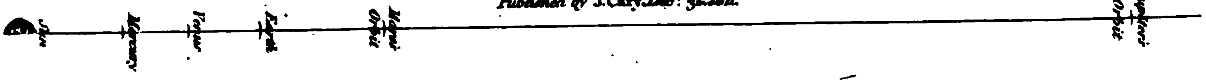
Magnitudes

1st	2d	3d	4th
✪	●	✦	•

MORNING.

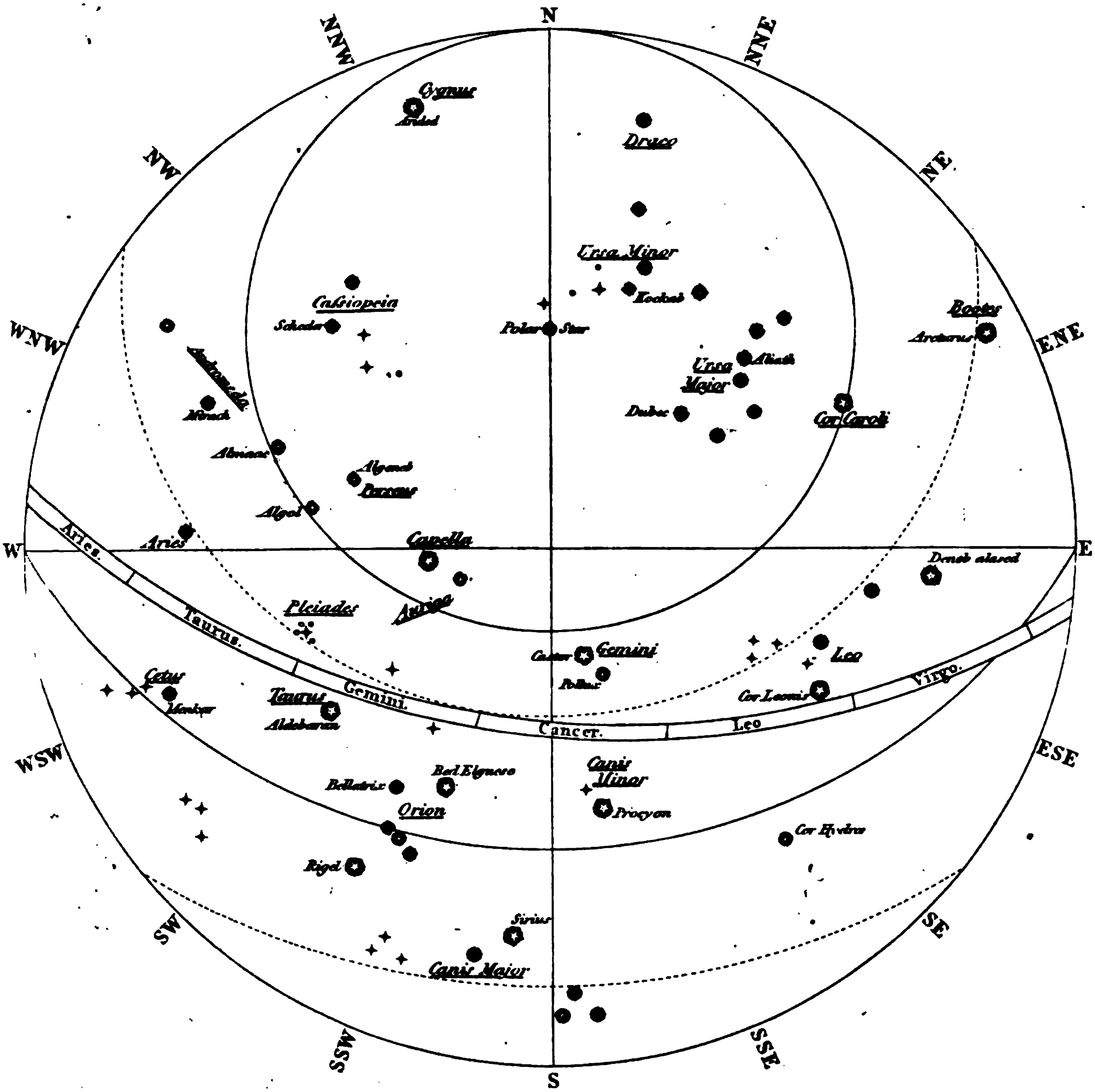
Middle of November at 1.—— October at 3.

Published by J. Cary. Decr 30. 1811.



Middle of February at 9 in the Evening.

March at 7.——— January at 11.



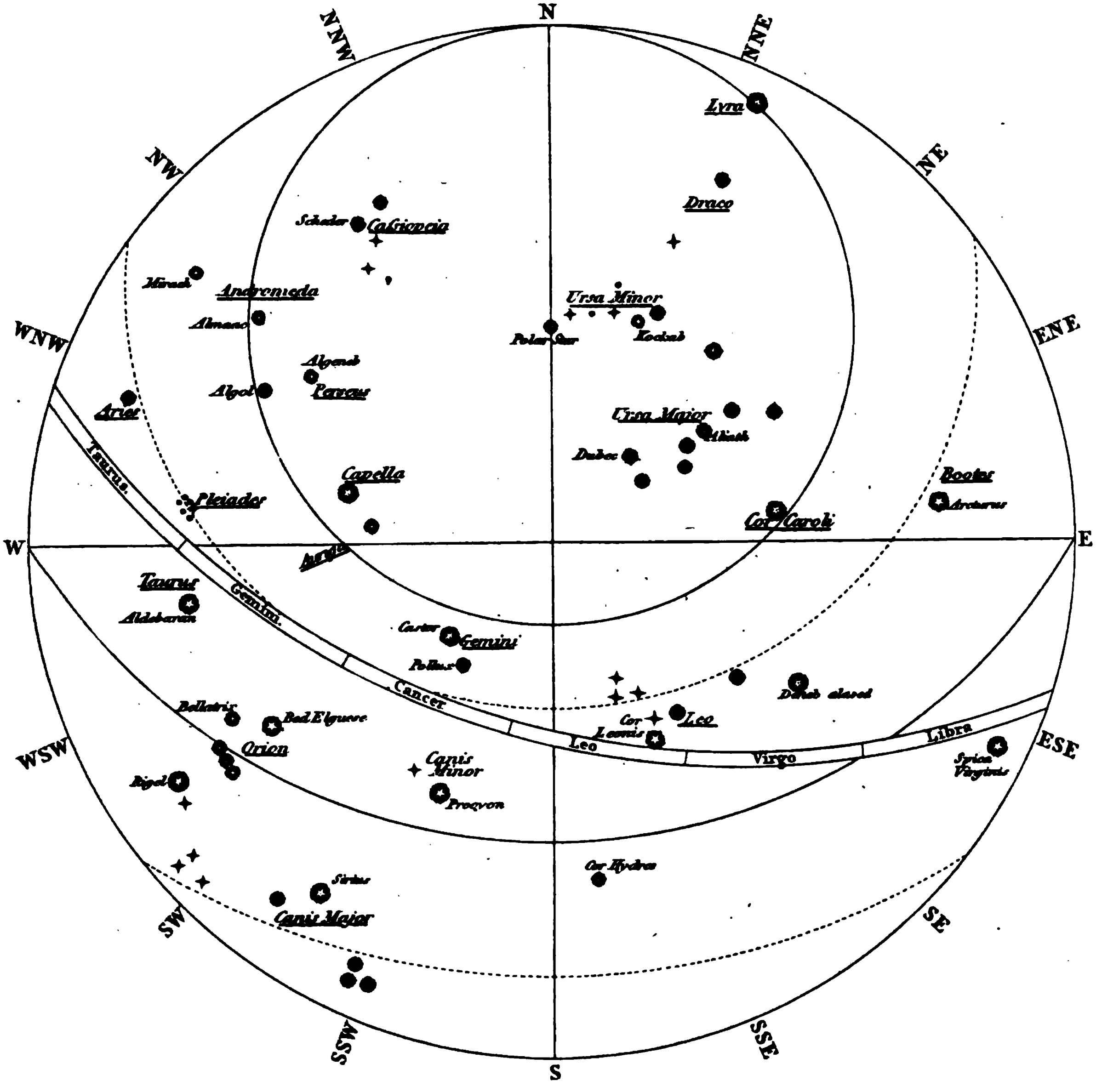
MORNING.

December at 1. November 3. October 5.

Published by J.Cary.Decr. 31.1811.

Middle of March at 9 in the Evening.

April at 7.   January at 11.



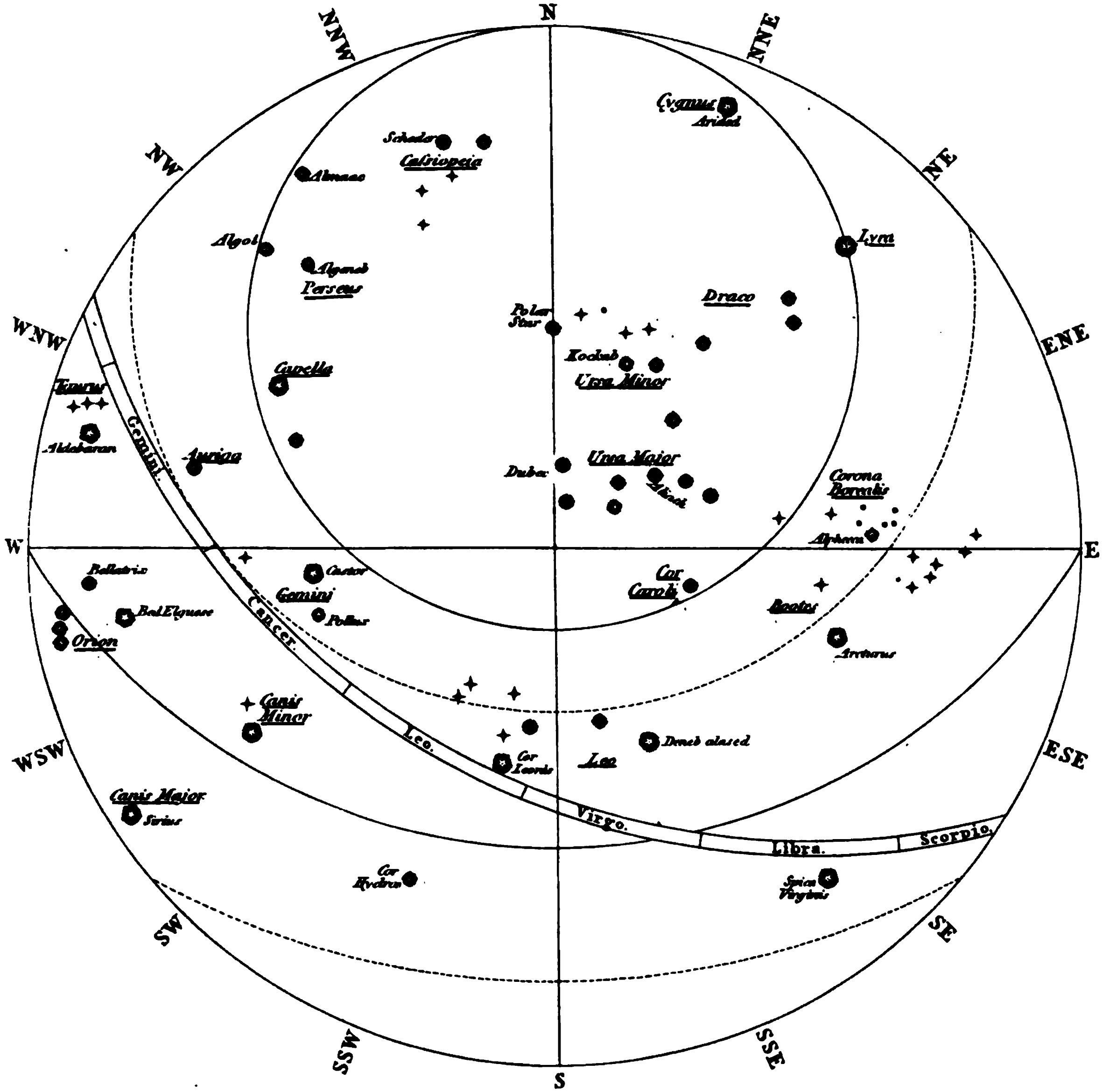
MORNING.

January at 1.   December 3.   November 5.

Published by J. Cary, *Dec.r 31. 1811.*

Middle of April at 9 in the Evening.

May at 7. —— March at 11.



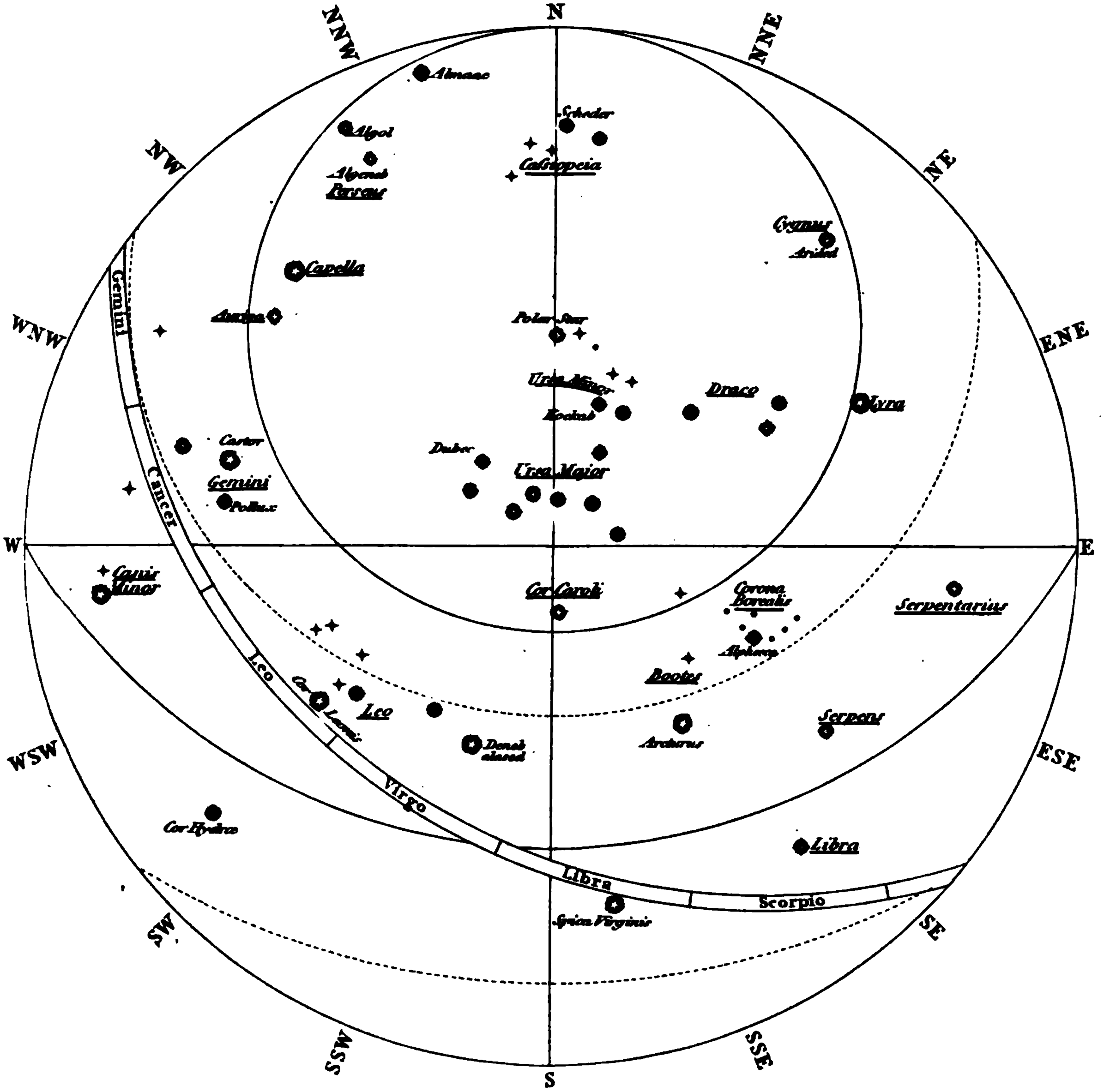
MORNING.

February at 1.–January 3.– December 5.

Published by J. Cary. Dec. 31. 1811.

Middle of May at 9 in the Evening

June at 7. April at 11.



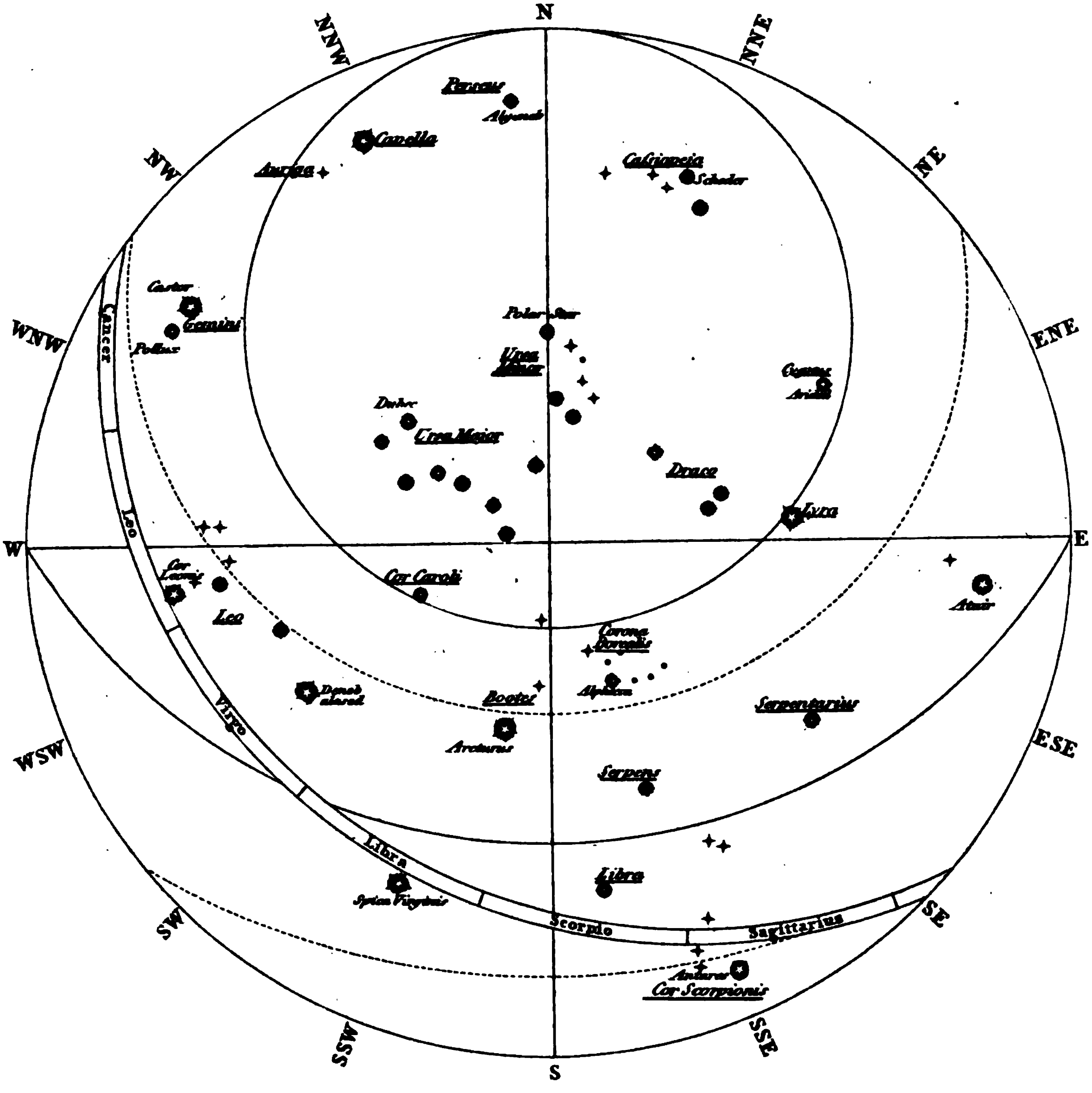
MORNING.

March at 1. February 3. January 5.

Published by J. Cary, Dec.r 31. 1811.

Middle of June at 9 in the Evening.

July at 7. May at 11.



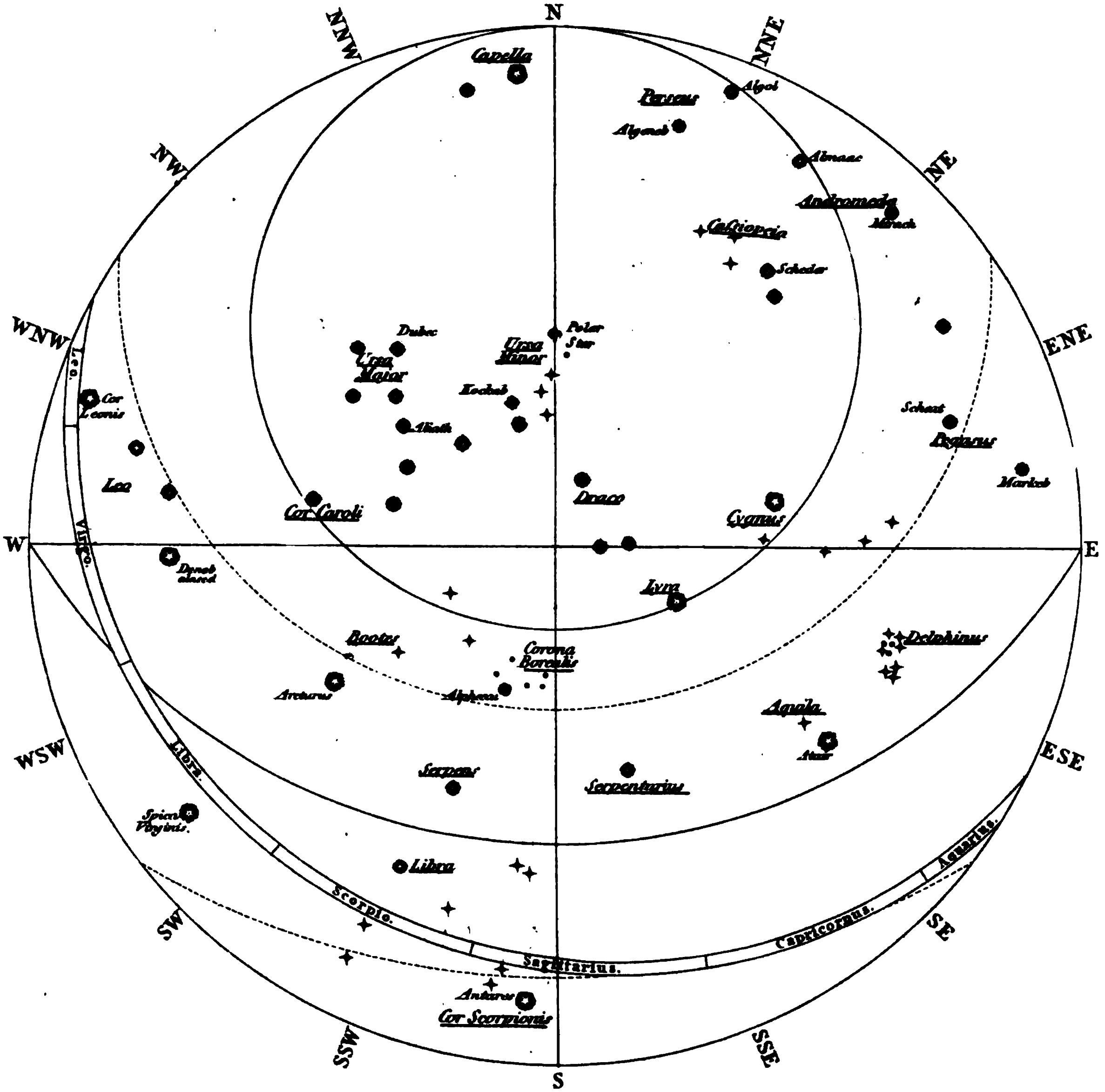
MORNING.

April at 1. March 3. February 5.

Published by J.Cary. Dec.31.1811.

Middle of July at 9 in the Evening.

August at 7.— June at 11.



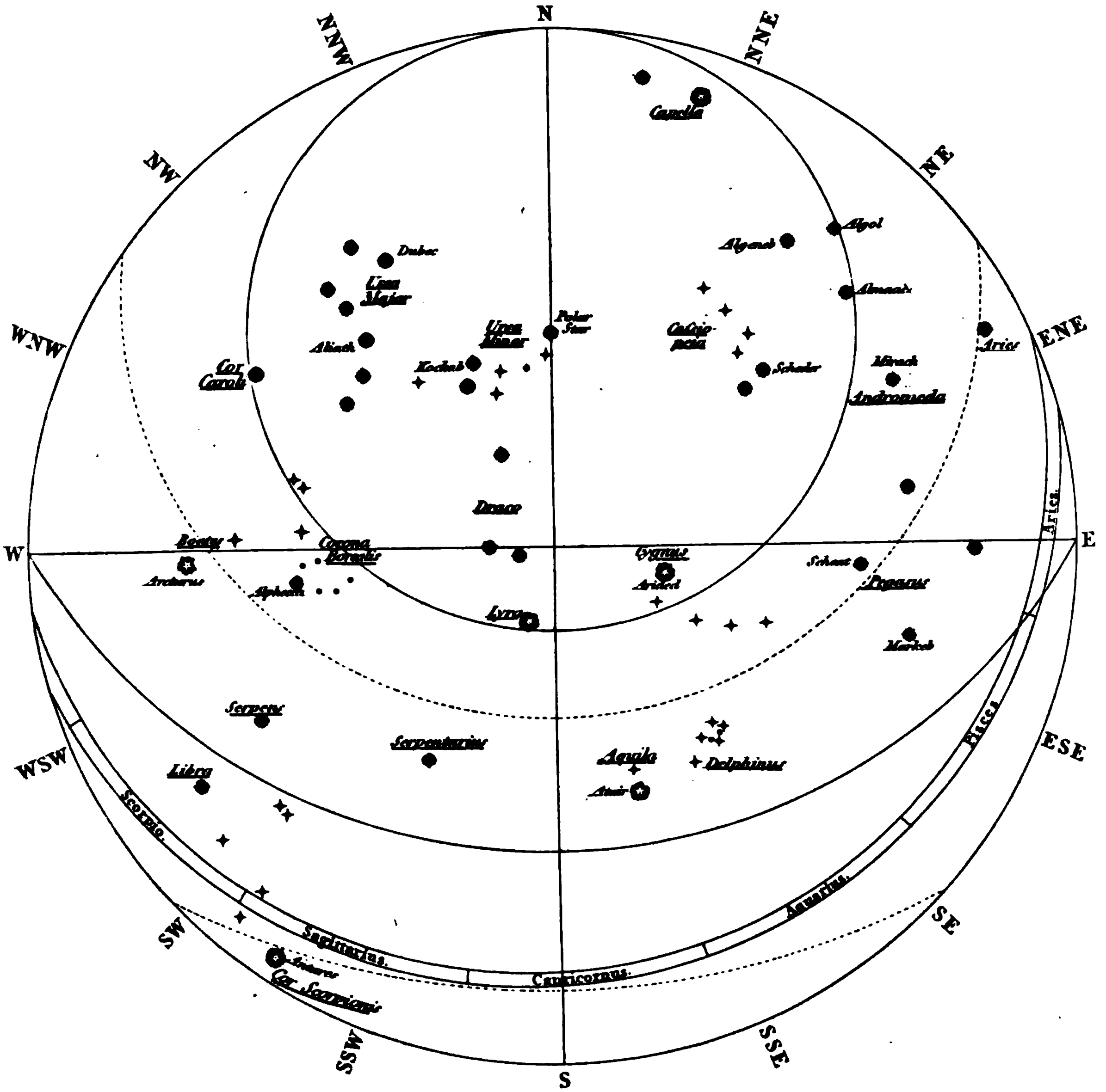
MORNING.

May at 1.—— April 3. —— March 5.

Published by J. Cary. Dec. 31. 1810.

Middle of August at 9 in the Evening.

September at 7.——— July at 11.



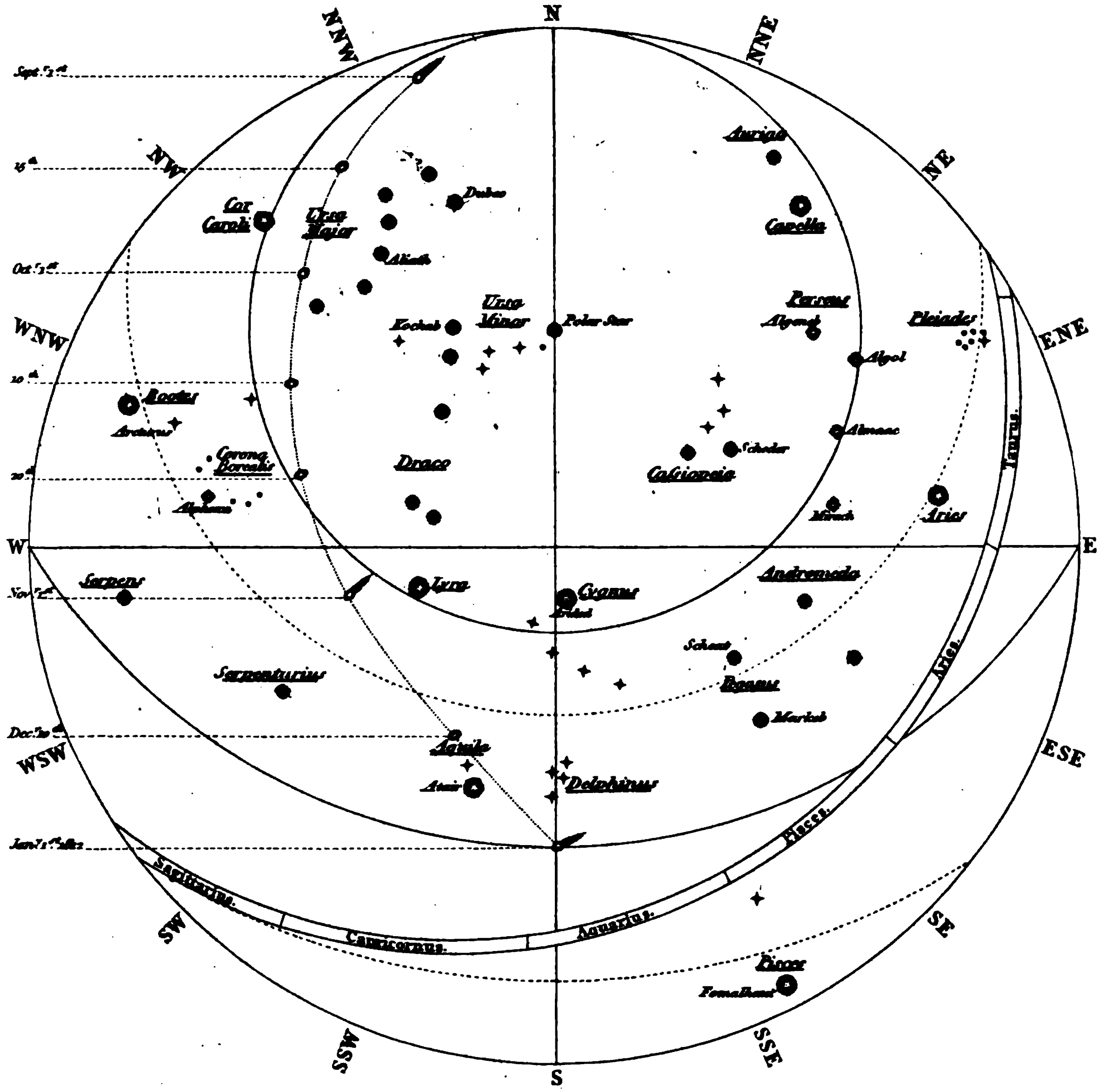
M O R N I N G.

June at 1.——— May at 3.

Published by J. Cary, *Dec. 31. 1811.*

Middle of September at 9 in the Evening

October at 7. —— August at 11.



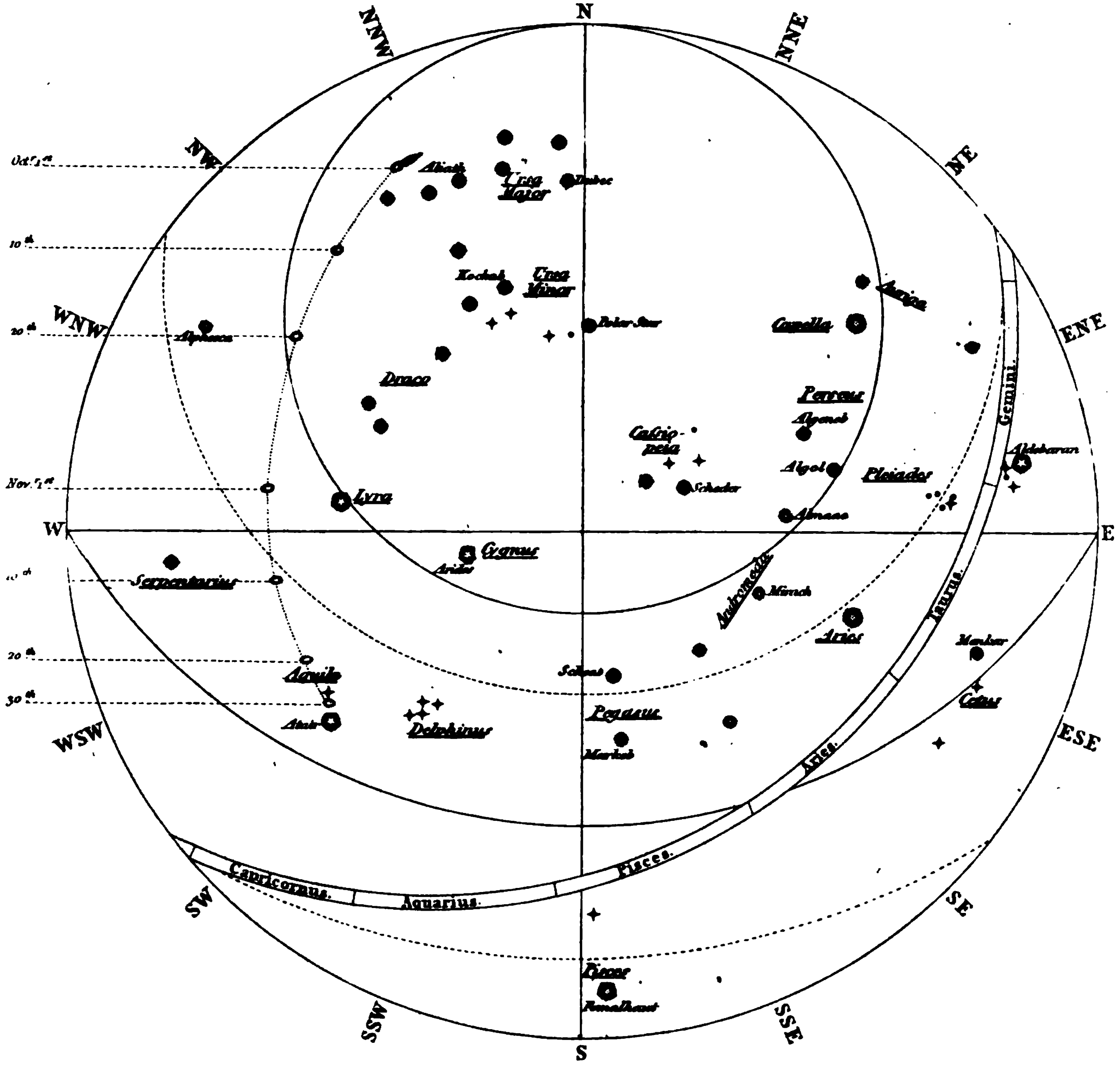
MORNING.

July at 1. —— June at 3.

In the above diagram is delineated the whole track of the remarkable Comet of 1811, from its appearance at the beginning of September, till its disappearance to the naked eye, at the end of the year.

Middle of October at 9 in the Evening.

November at 7. —— September at 11.



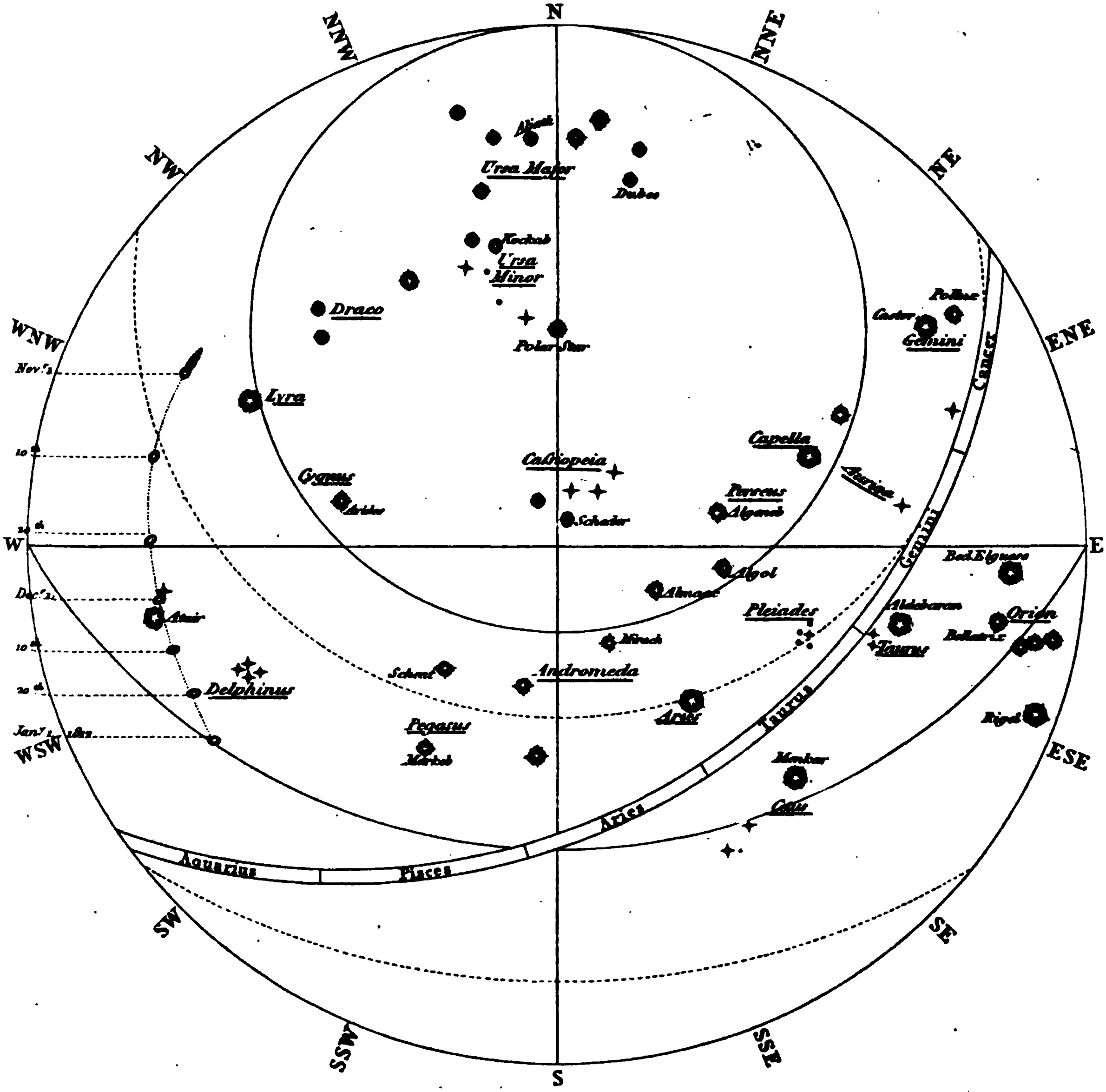
MORNING.

August at 1. —— July at 3.

This diagram contains the track of the Comet of 1811. as it appeared between 7 & 9 in the evening in the months of October & November.

Middle of November at 9 in the Evening.

December at 7. October at 11.



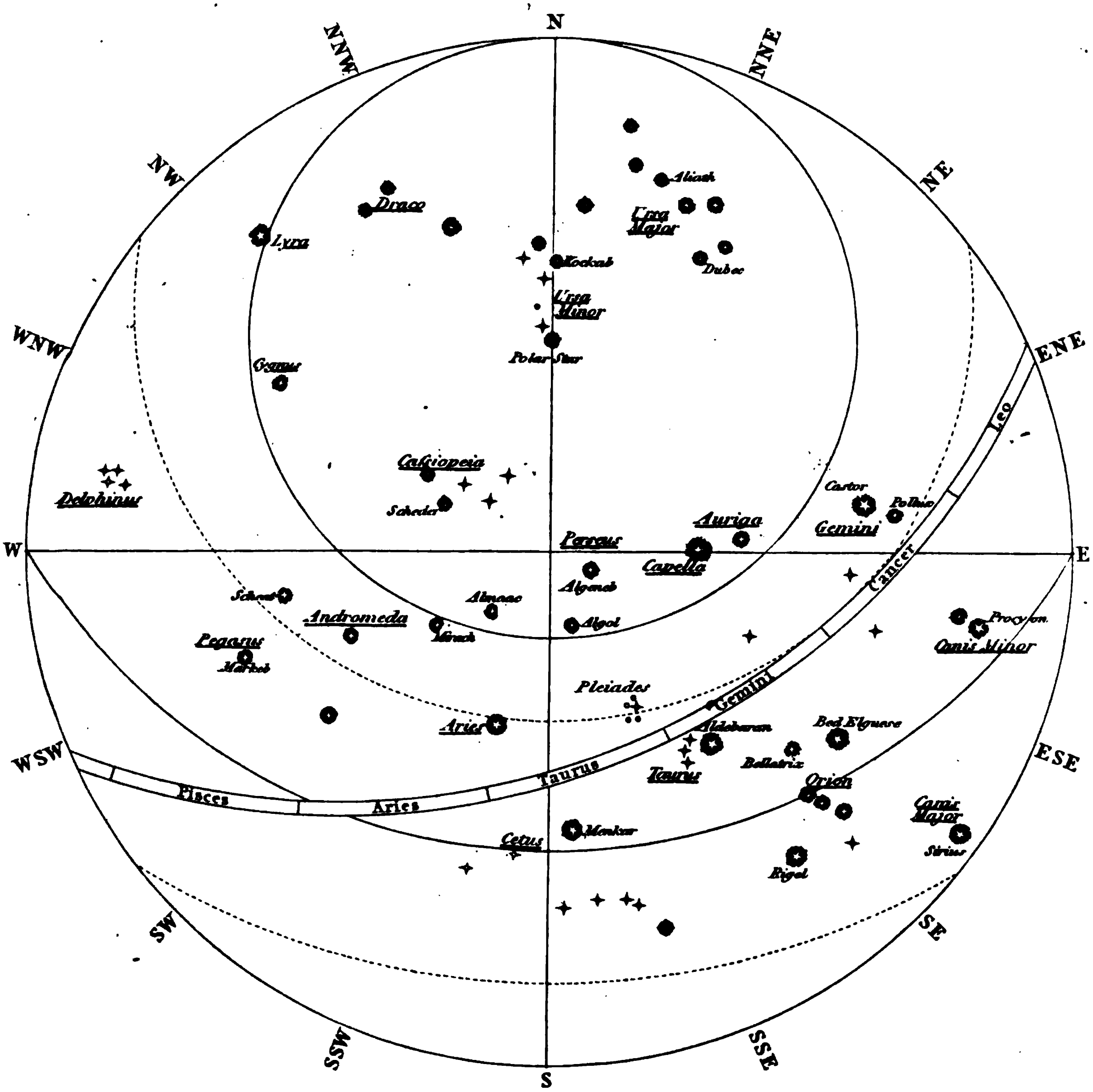
MORNING.

September at 1. August at 3.

This diagram contains the track of the Comet of 1811, as it appeared between 6 & 9 in the evening in the months of November and December.

Middle of December at 9 in the Evening.

January at 7. November at 11.



MORNING.

October at 1. September at 3.

Published by J.Cary. Dec.r [illegible]